

**SURVEYS FOR PARISH'S ALKALI GRASS
EDWARDS AIR FORCE BASE,
CALIFORNIA**

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SURVEYS FOR PARISH'S **ALKALI** GRASS ON EDWARDS AIR FORCE BASE, CALIFORNIA

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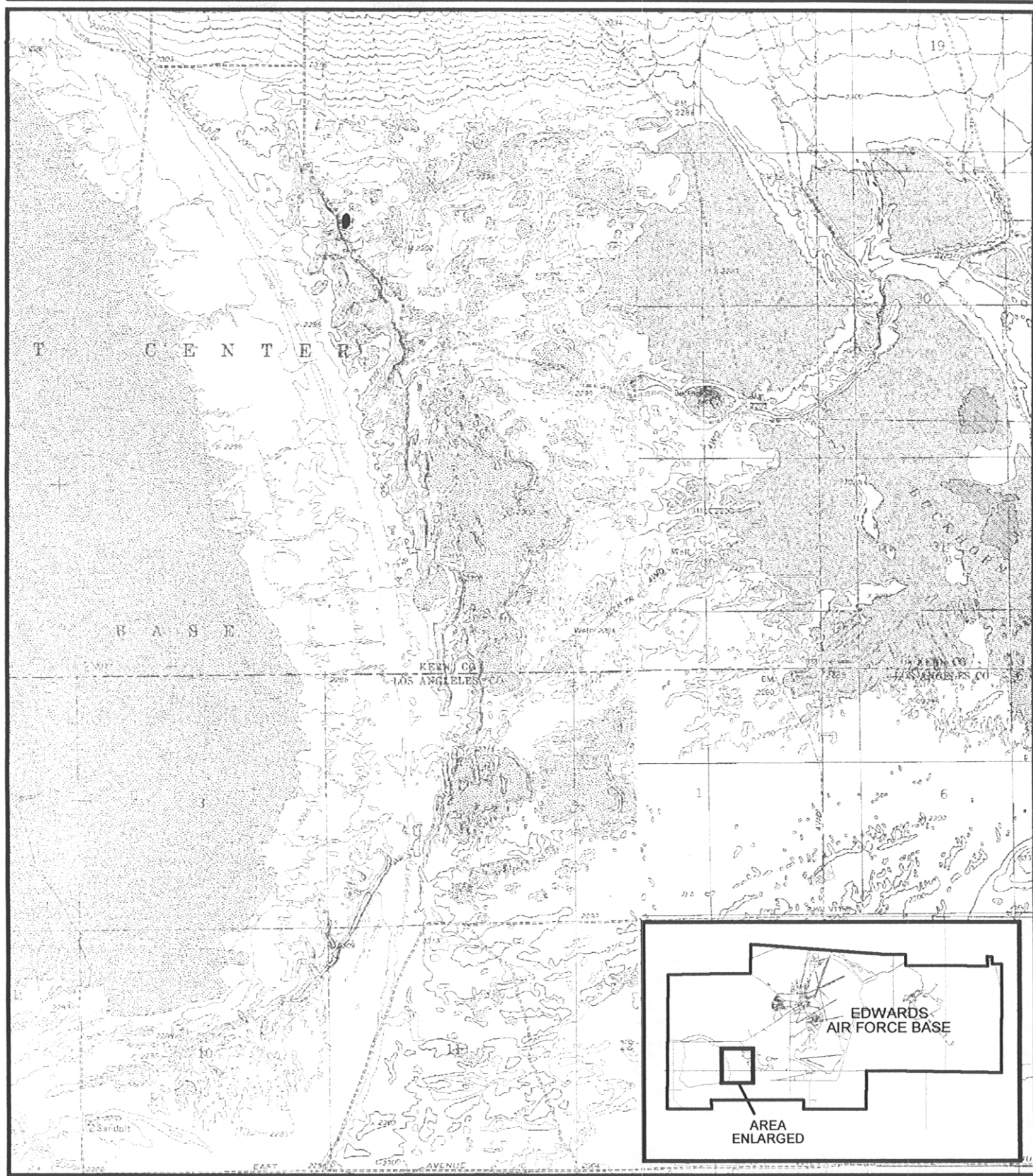
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Abstract: Surveys were conducted for Parish's alkali grass (*Puccinellia parishii*) in Spring 1995 on Edwards Air Force Base. Surveys were conducted at the site of one previously reported population and in six areas of potential habitat to document the presence or absence of Parish's alkali grass on the base; and to determine the number of individuals and population areas of the species on the base. Parish's alkali grass was not observed during these surveys, and all individuals of the genus *Puccinellia* identified within the survey areas were determined to be little alkali grass (*Puccinellia simplex*). Edwards Air Force Base is outside the normal range of Parish's alkali grass. Further surveys for the species on the base are not warranted at this time.

Parish's alkali grass (*Puccinellia parishii*) is a small, winter-spring annual grass (Family: Poaceae) that grows in alkaline meadows and mineral springs. Parish's alkali grass has a narrow inflorescence that is 1 to 8 centimeters (cm) long with the lower branches erect to reflexed in fruit. The leaf blades are less than 1 millimeter (mm) wide. The spikelets have three to six flowers and are about 3 to 5 mm long. Illustrations of Parish's alkali grass can be found in Hickman (1993) and Hitchcock (1951). This species is proposed for listing as endangered by the U.S. Fish and Wildlife Service and is on the California Native Plant Society's (CNPS) List 1B (plants considered rare or endangered in California or elsewhere).

Parish's alkali grass is only known from a few occurrences in Arizona, one in New Mexico, and one in California (Skinner and Pavlik 1994). The only confirmed California location of Parish's alkali grass is at Rabbit Springs, in the Lucerne Valley, San Bernardino County, approximately 64 kilometers (km) southeast of Edwards Air Force Base (AFB). This site was first documented in 1915 (*S.B. Parish* 9799, US) and is the type locality for the species (Hitchcock 1928). A second California location was documented in a 1970 collection (*B. Clayton* 384, FSC) 6 km south of Kramer Junction on Highway 395 (CDFG 1994), near the eastern edge of Edwards AFB. This population has never been relocated. One population of Parish's alkali grass was previously reported on the base in the area between Rosamond and Buckhorn Lakes (Figure 1). This report was made in 1992 from a collection (*D. Charlton* 5950, UCR, RSA) near the northeast edge of Rosamond Dry Lake (Charlton 1992). Charlton reported that 50 plants were found in an area less than 0.1 hectare (ha) within halophytic phase saltbush scrub along the west side of Homestead Road, approximately 2.5 km south of Rosamond Boulevard.



Population

2000 0 2000 Feet



**Previously Reported
Population of Parish's
Alkali Grass on
Edwards Air Force Base**

Figure 1

The primary purpose of these surveys was to determine the presence or absence of Parish's alkali grass on the base; and to determine the location, extent, and number of individuals of the species on Edwards AFB. This determination could aid in the development of a management plan to protect sensitive species with minimal impact to the Edwards AFB mission.

STUDY AREA

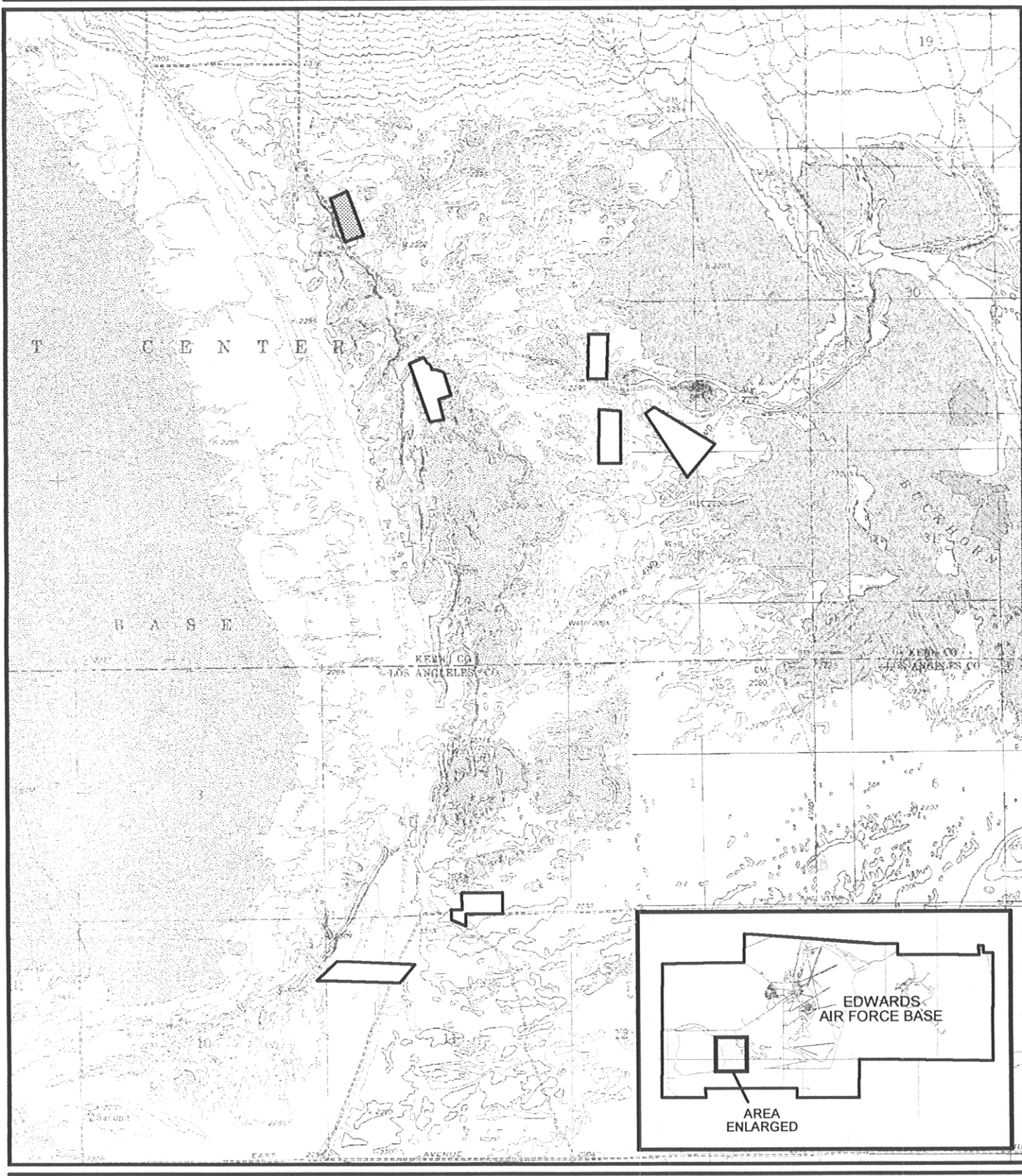
The study area for these surveys is consistent with the boundaries of Edwards AFB, California. Within the study area, seven survey areas were determined according to the work plan (Tetra Tech, Inc. 1995) and in consultation with the base biologist (Table 1 and Figure 2). One survey area was consistent with the boundaries of the previously reported population of Parish's alkali grass on the base, and six were established to survey areas of potential habitat for the species.



Table 1

Locations of <i>Puccinellia simplex</i> Survey Areas		
Study Area	USGS Topo Quad	Location
95RP035	Rosamond Lake, CA	NW¼ of NW¼ of Section 26, T9N, R11W
95RP3035	Rosamond Lake, CA	SW¼ of SE¼ of Section 2, T8N, R11W and NW¼ of NW¼ of Section 26, T9N, R11W
95RP3036	Rosamond Lake, CA	NE¼ of NE¼ of Section 10, T8N, R11W and NE and NW¼ of NW¼ of Section 11, T8N, R11W
95RP470	Redman, CA	SE¼ of SW¼ of Section 25, T9N, R11W and NE¼ of NW¼ of Section 36, T9N, R11W and NW¼ NE¼ of Section 36, T9N, R11W
95RP5100	Rosamond Lake, CA	SW¼ of SW¼ of Section 25, T9N, R11W and NW¼ of NW¼ of Section 36, T9N, R11W
95RP5101	Rosamond Lake, CA	NW and SW¼ OF SW¼ of Section 25, T9N, R11W
95RP5102	Rosamond Lake, CA	NE and SE¼ OF SW¼ of Section 26, T9N, R11W

METHODS

These surveys were originally scheduled to be conducted during Spring 1994; however, reconnaissance surveys revealed little or no germination of *Puccinellia* species at the previously recorded population. After consultation with the base biologist, surveys were postponed until the 1995 growing season. Field investigations were conducted in May 1995 when Parish's alkali grass was expected to be present and identifiable and to coincide with flowering and fruiting periods.



-  Detailed Survey Area
-  Potential Habitat Survey Area

Parish's Alkali Grass Study Area and Survey Areas



Figure 2

Two types of surveys were conducted: one detailed survey, and potential habitat surveys in six locations. The detailed survey was conducted within the previously reported population and included direct counts and characterization of individuals of Parish's alkali grass in this area. Potential habitat surveys were conducted to determine the presence or absence, number of individuals, and size of the populations of Parish's alkali grass in selected suitable areas of the base. Nomenclature follows Munz (1974).

Trimble GeoExplorer™ Global Positioning System (GPS) receivers were used to delineate the location of each survey area boundary. Other features recorded were areas, points, and lines indicating plant population locations. For populations larger than 50 square meters, the population boundary was recorded as a polygon. For populations smaller than 50 square meters, a single point near the center of the population was recorded. For populations that were linear (such as those found in a drainage), the population was recorded as a line. Data requirements for these surveys were collected in accordance with the Edwards AFB Geographic Information System (GIS) data dictionary. Table 2 summarizes the types of data collected for the detailed and potential habitat surveys, along with the method used in the collection of that data. Survey areas were located with the assistance of botanist David Charlton using USGS maps. Transect orientation was established and maintained by use of a compass and Bagging tape.

Detailed Survey

The survey area for the detailed survey was consistent with the previously reported boundary of the Parish's alkali grass population, extended by 30 meters (m) in every direction. The detailed survey for Parish's alkali grass took place on May 9 and 11, 1995. Field surveys were conducted by systematically walking transects (5 m wide and the length of the survey area) over the entire survey area. Transects were walked in a north-northwest orientation that was determined by the physical features of the site. The number of individual plants in a population were counted as transects were walked and individual plant data were collected for the first 500 individuals.

Potential Habitat Surveys

Potential habitat surveys were conducted between March 5 and June 19, 1995. Each of the six potential habitat surveys were conducted by walking transects (10 m wide). The length, width, and total area surveyed varied and was dependent on the presence or absence of the target species. If individuals of Parish's alkali grass were discovered, transect width was to be reduced to 5 m.

Incidental Detections

Incidental detections of Parish's alkali grass made throughout Spring 1995 are presented in this report. Other special status plant species that were observed during these surveys for Parish's alkali grass were recorded on USGS quadrangle maps in the field. For all incidental detections, the number of individuals and population size was estimated.

Table 2

Data Requirements and Methods			
Data Requirements	Detailed Survey	Potential Habitat Surveys	Methods and Units
Observation date	*	*	Actual date
Start and end time of each survey period	*	*	By 24-hour clock
Surveyor(s) initials	*	*	First and last initial
Survey Area identifier (ID)	*	*	A 7 or 8-digit alphanumeric using the year of survey (95), "RP" for rare plant, and a unique 3 or 4-digit number
Plant ID	*	*	A 3-digit number assigned in chronological order (001, 002, etc.)
Number of individuals	*	*	Counted in the field up to 500 using hand held tally counter or estimated if over 500
Phenological stage	*	*	CNPS definitions (percent in each class)
Plant height ¹	*	*	Measured from ground to highest part not including inflorescence to the nearest mm with a tape measure
Inflorescence length ¹	*	*	Measured to the nearest mm with a tape measure
Number of inflorescences ¹	*	*	Counted individually
Distance to nearest plant, same species	*	*	Measured to the nearest mm with a tape measure
Habitat description for each study area:			
Zonal habitat and azonal habitat	*	*	Zonal habitat read from base vegetation maps in Mitchell <i>et al.</i> 1993 or visually determined in the field; azonal habitat visually determined in the field
Associated plant species	*	*	Visually determined in field
Geomorphology	*	*	Visually determined in field using GIS domain table
Soils	*	*	Visually determined in field using GIS domain table
Slope	*	*	Measured in percentage with clinometer
Aspect	*	*	Estimated in the field
Weather conditions for each survey period:			
Maximum and minimum daily temperature	*	*	Measured in Celsius with standard scientific thermometer
Maximum daily wind speed	*	*	Estimated in the field
Wind direction	*	*	Estimated in the field
Maximum percent cloud cover	*	*	Estimated in the field
Location:			
County	*	*	County name
USGS quadrangle	*	*	USGS quad name
Township, range, section	*	*	Read from USGS quad
Elevation	*	*	Read from USGS quad or determined from GPS data

Notes: ¹Herbivory recorded to separate data for browsed and unbrowsed individuals

RESULTS

No Parish's alkali grass was found during these surveys. Another *Puccinellia* species, little alkali grass (*Puccinellia simplex*) occurred in six of the seven survey areas. All results presented here are for little alkali grass. Table 3 presents a summary of data collected during these surveys, and Figure 3 shows locations of little alkali grass populations within the detailed survey area and the five of the six potential habitat survey areas.

Table 3

Summary List of *Puccinellia simplex* Populations

Study Area ID	Survey Type	Number of Individuals	Population Area (ha)*	Area Surveyed (ha)*	Zonal Habitat	Azonal Habitat	Geomorphology	Soil Texture	Elevation (meters)	Slope	Aspect
95RP035	Detailed	723	0.01	3.4	HPSS	CLAY	PAN, DUNE	CL	700	2	E
95RP3035	Potential	11	0.01	3.6	HPSS	CLAY	PAN, DUNE	SLTCL	700	1	NW
95RP3036	Potential	998	2.50	4	HPSS	CLAY	PAN, DUNE	CLLM	696	1	N
95RP470	Potential	286	0.20	9	HPSS	CLAY, DU	PAN, DUNE	SLTCL	698	0	NA
95RP5100	Potential	10,770	0.54	2.4	HPSS	CLAY, DU	PAN, DUNE	SLTCL	701	0	NA
95RP5102	Potential	14,830	0.40	9.2	HPSS	CLAY, DU	PAN, DUNE	SLT	701	0	NA

Notes: *ha = hectare

Zonal Habitat

HPSS = Halophytic phase saltbush scrub

Azonal Habitat

CLAY = Clay pan
DU = Dune

Geomorphology

DUNE = Dune
PAN = Pan

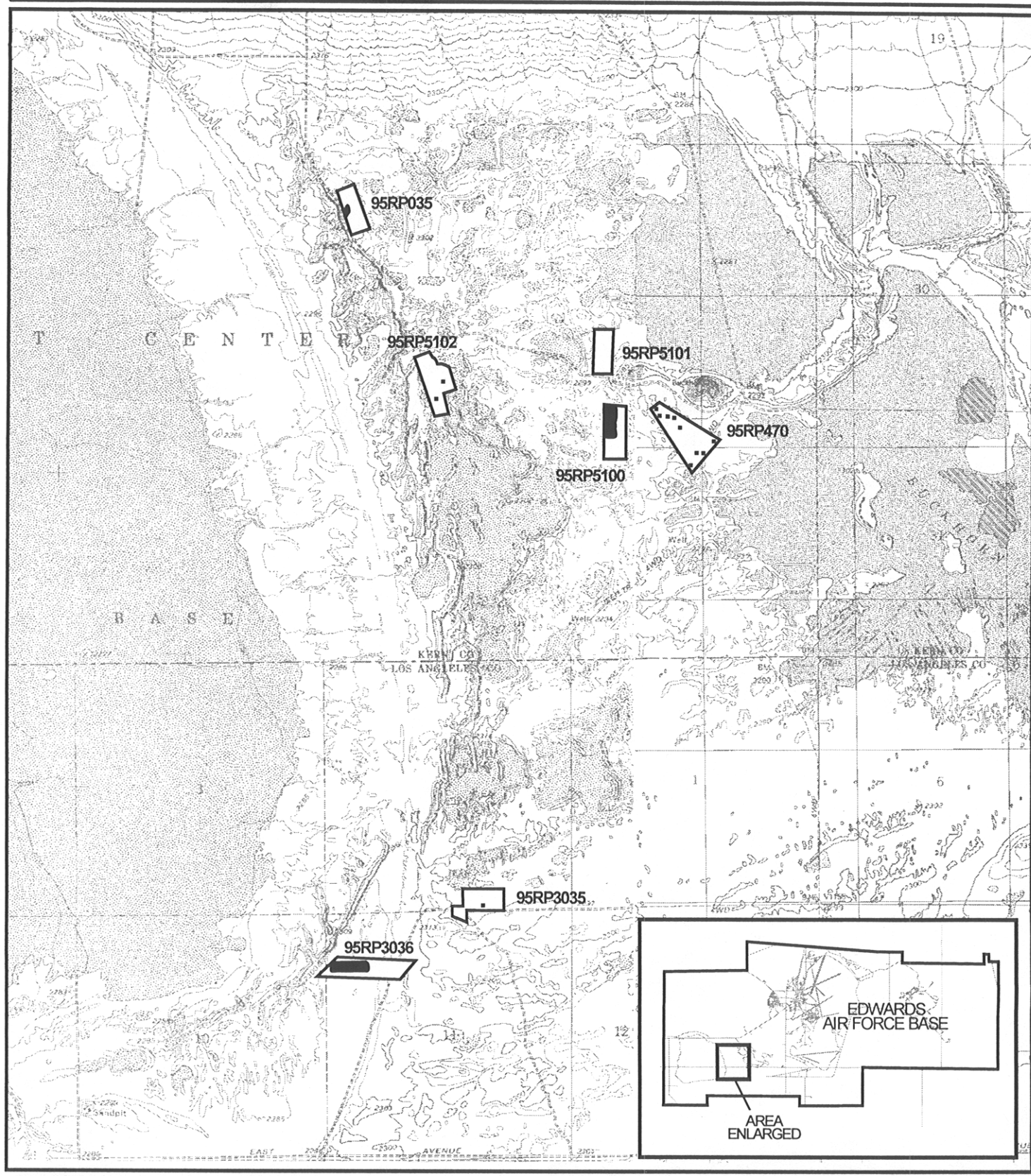
Soil Texture

CL = Clay
CLLM = Clay loam
SLTCL = Silty clay

Aspect

N = North
NW = northwest
NA = Not applicable

All observed populations of little alkali grass were in areas of halophytic phase saltbush scrub in relatively flat, low-lying areas where clay pans of various sizes alternated with slightly higher stabilized low dunes. Populations of little alkali grass were found primarily on the edges of clay pans, but some occurred within the interface of clay pans and the lower dune slope. The low dunes were typically less than a meter higher than adjacent clay pans. The most common shrubs included shadscale (*Atriplex confertifolia*), spiny saltbush (*A. spinifera*), and inkweed (*Suaeda fruticosa*). Little alkali grass occurred both in the open and under the shade of neighboring shrubs. All observed populations occurred in areas of alternating pan and dune geomorphology at elevations between 696 and 701 m with slopes between 0 and 2 degrees. Surface soil texture on the clay pans was very fine clay or silty clay. The low dunes in this area were not typical sand dunes, but composed of fine textured particles of silt and fine sand. All little alkali grass populations occurred in soils of clay and/or silt. Where populations occurred on slopes, the aspect was evenly divided with the exception of never being oriented to the south.



 Survey Area
 Population
 95RP5100 Survey Area ID

Little Alkali Grass *(Puccinellia simplex)* Populations

2000 0 2000 Feet



Figure 3

Weather data are summarized in Table 4 for these surveys and show that minimum temperatures ranged from 16 degrees Celsius (°C) to 30 °C with a mean of 23.88 °C, while maximum temperatures ranged from 24 °C to 36°C with a mean of 29.63 °C. Wind speed ranged from 2 to 35 kilometers per hour (kph) with a mean of 13.13 kph. Cloud cover ranged from 5 to 90 percent with a mean of 48.75 percent.

Table 4

Weather Data During Surveys

Date	Study Area ID	Start Time	End Time	Maximum Temperature (°C)	Minimum Temperature (°C)	Maximum Wind Speed	Wind Direction	Maximum Cloud Cover
5/9/95	95RP035	845	1730	24	17	10	SW	30
5/11/95	95RP035	800	1530	26	16	30	W	30
5/19/95	95RP5100	1030	1312	30	27	2	S	70
5/19/95	95RP5101	1400	1525	36	30	2	S	80
5/19/95	95RP5102	1530	1800	32	24	3	NW	90
5/20/95	95RP3035	1100	1400	29	26	3	SW	5
5/20/95	95RP3036	1410	1700	33	28	35	SW	10
5/21/95	95RP470	830	1115	27	23	20	W	75

Note: Temperature recorded in °Celsius.

Detailed Survey

The survey area was 340 m x 100 m, totaling 3.4 ha. Individuals of little alkali grass were found along the western edge of the large clay pan in the same area previously reported as a Parish's alkali grass population. The population area was a narrow band about 1 m wide and 110 m long, totaling 0.011 ha (Figure 3). A total of 723 little alkali grass plants were recorded in this area.

Halophytic phase saltbush scrub with a thick undergrowth of annuals was found on the lower slope of a large dune west of the little alkali grass population. Little alkali grass individuals were primarily located where the saltbush scrub ended at the edge of the clay pan. Inkweed and spiny saltbush with patches of pepper grass (*Lepidium flavum*) and other annuals were recorded at the clay pan edge. Little alkali grass individuals also occurred on bare clay within a meter of the edge of the clay pan.

Individual plant data were recorded for 500 of the 723 little alkali grass individuals. More than 80 percent were in the fruit or flower-and-fruit phenological stages (Table 5). Approximately 15 percent were in flower, 2 percent were vegetative, and 1 percent were dormant. Dormant is defined as not actively growing. This stage was determined by the lack of flowering parts and no evidence of new vegetative growth. Forty-five percent of the plants measured showed signs of herbivory. The mean height for browsed plants was approximately 30 percent lower than for unbrowsed (Table 6). There was a wide variation in inflorescence number and plant height in this population. The distance to the nearest little alkali grass showed a large variation in the population with a standard deviation more than three times the mean.

Table 5

Count and Percent of Total Sample for Each Phenological Stage and Browse Condition

Phenological Stage/Browse Condition	Count	Percent of Total with Confidence Interval
Vegetative	12	2.4 \pm 1.3
Flower	76	15.2 \pm 3.2
Flower and Fruit	205	41.0 \pm 4.3
Fruit	202	40.4 \pm 4.3
Dormant	5	1.0 \pm 0.9
Unbrowsed Plants	276	55 \pm 4.0
Browsed Plants	224	45 \pm 4.0
Total:	500	100

Table 6

Number of Inflorescences, Plant Height, and Distance to Nearest Plant of the Same Species

Parameter	Condition	Mean with Confidence Interval	Standard Deviation	Range	Sample Size
Number of Inflorescences	All plants	3.92 \pm 0.24	2.72	0 - 24	500
	Browsed	3.97 \pm 0.38	2.86	0 - 24	224
	Unbrowsed	3.89 \pm 0.31	2.61	0 - 18	276
Plant Height (cm)	All plants	6.85 \pm 0.37	4.25	1.0 - 21.2	500
	Browsed	5.50 \pm 0.44	3.30	1.0 - 19.7	224
	Unbrowsed	7.94 \pm 0.55	4.60	1.1 - 21.2	276
Distance to Nearest Plant, Same Species (cm)	All plants	8.40 \pm 2.40	27.26	1.0 - 565	500

Potential Habitat Surveys

In potential habitat surveys, a total of 27,618 little alkali grass plants were counted and/or estimated in six survey areas. Population sizes ranged from 11 to 14,830 plants (Table 3). Population areas were small, ranging from 0.02 to 2.5 ha, with five of the six sites smaller than 0.6 ha. No correlation was evident between the number of individuals in a population and the size of the population.

Incidental Detections

No Parish's alkali grass was detected incidental to other surveys during Spring 1995. Other sensitive plant species occurred in the detailed survey area and all six potential habitat survey areas, Alkali mariposa lily (*Calochortus striatus*) is a federal species of concern and was found in four of the survey areas; the number of plants observed ranged from 3 to 100 individuals. Golden goodmania (*Oxytheca luteola*) was found in six of the survey areas, often with thousands of individuals present. Mojave spineflower (*Chorizanthe spinosa*) occurred in one survey area, with about 500 plants recorded. Golden goodmania and Mojave spineflower are listed by the CNPS as plants of limited distribution (CNPS List 4).

DISCUSSION

Parish's alkali grass, the proposed endangered species which has been reported from Edwards AFB, was not observed during this smdy. The previously reported population was determined to be little alkali grass, which has no special status. All *Puccinellia* species found on the base were little alkali grass. Based on this survey, it is unlikely that Parish's alkali grass occurs in the area between Rosamond and Buckhom Lakes.

These surveys of the area of the previously reported population of Parish's alkali grass and all potential habitat areas showed that only little alkali grass inhabits these areas. Extensive potential habitat for alkali grass species exists on the base surrounding all of the major playas. Little alkali grass may be more common in the Mojave Desert than previously known. Little alkali grass is widespread in California, and additional surveys or data collection for this species on Edwards AFB are not warranted.

Other rare plant surveys conducted in the area south of Kramer Junction in 1995 did not identify Parish's or little alkali grass in that part of the base. A population of Parish's alkali grass was documented near that area in 1970. It is recommended that a definitive determination of the 1970 collection be made since this population has not been relocated, nor was either species identified during 1995 surveys. Based on the results of this survey and the known type locality for Parish's alkali grass, further surveys for this species on Edwards AFB are not recommended at this time.

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PERSONAL COMMUNITCATIONS

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1995 Botanist, Computer Sciences Corp. Personal communication.

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